SCIENCE

FRIDAY, SEPTEMBER 21, 1888.

THE WANT which has been long felt in cities for properly trained nurses has been fully met by the training-schools, which have sprung up in almost every city, and in connection with almost every hospital. But in the smaller towns and villages the need is as great as ever, and, so far as we know, no effort has been made to meet it. It has been claimed that the supply has not been furnished because there was no demand for such services. This may be true to some extent, but does not account for the almost total lack of properly educated nurses in the country. The explanation is, we think, rather that, the system being a comparatively modern one, it was but natural that it should at first be put into operation in the large centres of population; and, as these are now fairly well supplied, it will doubtless follow that when the supply exceeds the demand, as it bids fair soon to do, the trained nurse will naturally seek employment in the smaller towns and villages. In the mean time residents of these villages who desire to introduce such a system into the places of their residence will find the fullest instructions in a book recently written by Dr. Worcester of Waltham, entitled ' A New Way of training Nurses.'

THE STANLEY EXPEDITION.

IT may be well to review at the present time the progress of the Stanley expedition and the events on the upper Kongo, in order to understand the real value of the numerous rumors that have been reported as to the fate of the explorer and of his caravan. On March 18, 1887, Stanley arrived at Banana, and with some difficulty reached Leopoldville on Stanley Pool on April 20. On June 2 he left his camp at the mouth of the Aruvimi, ascending the latter river. At that time it was hoped by well-informed persons that he might be able to reach Wadelai towards the end of July, although a delay of many months did not seem at all improbable. On Aug. 4 it was announced that on the 18th of June, Stanley had reached the rapids of the Aruvimi, and that he was preparing to make a portage. On June 23 Stanley sent a letter from Yambuya on the Aruvimi, and on July 12 a despatch was sent that all was well. He was proceeding up the Aruvimi with a caravan of fifty Europeans and four hundred and sixty-five soldiers and carriers.

Near the mouth of the Aruvimi, Major Barttelot was left in command of a fortified camp with four European and one hundred and twenty-five Zanzibar soldiers, and ample provisions, with the instruction to follow on Stanley's route as soon as Tippo-Tip should have gathered a sufficient number of carriers. It will be remembered that at that time the Arabs were in possession of Stanley Falls Station, and that, by appointing Tippo-Tip chief, the Kongo Free State hoped to again get control of that place. On May 31 Stanley and Tippo-Tip separated, after having passed Bangala. The latter, accompanied by ninety-six persons, and Major Barttelot, who was in command of forty Sudanese soldiers, proceeded up the Kongo. On June 22 Barttelot reached Yambuya, where he met Stanley. Tippo-Tip, on his arrival at Stanley Falls, and on announcing his appointment as chief of the Falls Station, met with some resistance among the Arabs, particularly from one Said-ben-Habub, who refused to obey him. Tippo-Tip then demanded from the Kongo State two officers and thirty soldiers for enforcing his commands. When this news reached Europe, Captain Liévin Van de Velde was appointed commander of the garrison of Stanley Falls, and left Antwerp on Oct. 23. Unfortunately he died a few days after his arrival on the Kongo. For a long time no news from Barttelot reached the coast, until a despatch from St. Paul de Loanda, dated May 1, announced that Mr. Ward had arrived from Yambuya at Boma, with the news that nothing had been heard from Stanley since July, 1887. Tippo-Tip had left for Kasongo, situated above the Falls, on Nov. 16, but in March he had procured only two hundred and fifty carriers. Jamieson had gone to the same place to urge the despatch of three hundred and fifty carriers more who were wanted. He was expected back at Yambuya on May 14, and Barttelot did not expect to leave until June 1. It was his intention to proceed *via* Stanley Falls, where he intended to leave an officer in charge of every thing he could spare. Later on, Jamieson reported their intention to start. The last news from this region was that the Falls Station was re-occupied by the Kongo Free State, under command of Captain van Gèle.

The numerous reports of Stanley's death or of his progress that were published at brief intervals were without any foundation. The only rumors from the west coast that had any elements of truth were contained in Barttelot's last letter, which was received in Brussels on the 15th of June. In December, 1887, several deserters from Stanley's expedition were met with several days' journey up the Aruvimi by Arabs. They told that they had left Stanley after five months' hard travelling in a mountainous region, covered with dense forest and very populous, the expedition having to fight frequently against the natives. In one of these struggles Stanley was said to be wounded. The situation at Yambuya was very difficult on account of scarcity of food. Tippo-Tip, although not unwilling to keep his promise of sending carriers, found it extremely difficult to induce the natives to take part in an expedition toward the unknown northern regions.

It is well known that deserters always describe the state of the caravans as hopeless, in order to exculpate themselves, and therefore their tale must be accepted *cum grano salis*. This report was repeated, somewhat amplified and exaggerated, by a despatch of Reuter's Bureau.

We turn to considering the news coming from East Africa. A despatch of May 28 shows how slowly trustworthy information travels this way. This telegram, which was published in the London *Times*, stated that letters were received from Barttelot, dated Stanley Falls, Oct. 25, which referred to some deserters having come down to that station.

While this meagre news is all we know about Stanley, letters from Emin Pacha come in comparatively regularly, showing that an open route exists from his province to Zanzibar. The last letter from the region occupied by Emin Pacha was written on Dec. 5, 1887, by Casati, at Guaia in Unyoro. He says, "I do not believe that Stanley will arrive very soon. No news, however vague, has come here from the West. I am convinced that he cannot be here before March. The size of his caravan, and consequent difficulty of obtaining provisions, sickness, etc., — these are serious obstacles to his rapid progress."

Another report from this region was obtained at Cairo, July 5. A messenger who had left Khartum May 25 says that he has noticed the preparations made by the Mahdi since the middle of March for an expedition against Emin. The expedition consisted of four thousand men, who took passage in four old steamboats of Gordon.

The last exciting reports from this region are the Reuter despatches referring to the white pacha who was said to be encountered by Arabs in the Bahr-el-Gazal region. It is hardly possible to tell what may be the foundation of these repeated reports.

From all these facts we conclude that there is no foundation to the numerous reports of Stanley's death. The difficulties he must have encountered on his march must have been unexpected, or he may have had in view an object entirely different from the alleged ' relief ' of Emin Pacha. So far, we are not justified in supposing that he has perished, else some news to this effect would have reached the Kongo.

A few days ago a despatch was sent from the Kongo reporting

the death of Barttelot, who was murdered by his carriers. It has not been stated how this news reached the coast, but, since the re-establishment of intercourse with Stanley Falls, its authenticity seems not improbable. The cable (London, Sept. 14) reports, "A despatch from St. Paul de Loanda states that Major Barttelot was shot on July 19 by his Manyema carriers. The head Arab and his men thereupon ran off to Stanley Falls, where Jamieson is making arrangements with Tippo-Tip for the organization of an expedition. He will proceed as quickly as possible. The London newspapers are unanimously of the opinion that Major Barttelot was betrayed by Tippo-Tip, who organized the native portion of the expedition; and the question is asked, Why may not Stanley have been also the victim of his treachery? Nyangwe, the home of Tippo-Tip, is three hundred miles distant from Stanley Falls. The first despatch said that Tippo-Tip was at Nyangwe. The second does not indicate whether he is still there, or has returned to Stanley Falls. Colonel De Winton is of the opinion that Barttelot was murdered between the twenty-eighth and twenty-ninth degrees of east longitude at about the second degree of north latitude. The Manyema twice attempted to take Livingstone's life. The second despatch removes from the Arabs the suspicion of treachery."

All the evidence tends to show that there is no intention on the part of Tippo-Tip to betray Stanley. Furthermore, it must be borne in mind that Barttelot at an early date had an encounter with natives of the same tribe, in which several of Tippo-Tip's men were killed. It seems that he was almost too energetic in his dealings with the natives.

A despatch dated London, Sept. 16, says, "Captain Vangele, who has just returned to Europe from the Kongo country, says he is convinced of Tippo-Tip's innocence of the murder of Major Barttelot. Tippo-Tip, he says, is engaged entirely in commerce, and had an interest in the success of Major Barttelot's expedition. The porters who accompanied the expedition were furnished by Tippo-Tip. They agreed that they should be paid on reaching Zanzibar, and to this fact Captain Vangele partly attributes the murder, because the payment of the porters depended upon the success of the journey. He thinks the strict discipline preserved by Barttelot may also have aroused hostility. He believes that Jamieson will find it difficult to organize a new expedition. Captain Vangele is convinced that Stanley is safe."

It is not quite clear to us whether 'Vangele' is the same Van Gèle who left Leopoldville on April 26 to occupy Stanley Falls. His return to Europe at this time seems hardly probable, although we do not know what has been going on on the upper Kongo during the last months.

Meanwhile committees are forming in various countries for the relief of Emin, or rather for supplying Emin with ammunition and opening a route to his province. Foremost in these endeavors is at present the German East African Association, but so far no definite results have been obtained.

MEDICAL MUSEUMS.

THE Congress of American Physicians and Surgeons closed its meeting in Washington last evening with an address in the National Museum from the president, Dr. John S. Billings, and a reception in the Army Medical Museum. Dr. Billings's audience was a large and appreciative one; and he made his address on medical museums, with special reference to the Army Medical Museum at Washington, exceedingly interesting as well as instructive and suggestive.

The necessity of economizing space prevents the reproduction here of the very interesting historical enumeration of the leading medical museums of the world, with which Dr. Billings opened his address, and we pass at once to the central topic, condensing as the exigencies of space demand. He said: —

"This collection, known as the Army Medical Museum, owes its inception to Dr. William A. Hammond, one of whose first acts after becoming surgeon-general, in 1862, was to issue a circular stating, that, 'as it is proposed to establish in Washington an army medical museum, medical officers are directed diligently to collect, and to forward to the office of the surgeon-general, all specimens of morbid anatomy, surgical or medical, which may be regarded as valuable, together with projectiles and foreign bodies removed, and such other matters as may prove of interest in the study of military medicine or surgery.' By the end of the year, over a thousand specimens had been collected, and the catalogue printed in 1866 showed that it contained 7,716 specimens. It is not my purpose in this address to trace the history of its development: that must be done elsewhere. It has recently been placed, with the library, in a conveniently arranged fire-proof building, and on the 1st of July last contained over 15,000 specimens besides those contained in its microscopical department, divided as follows: —

Comparative anatomy	1,689
Pathological	8,354
Medals	384
Microscopical specimens	10,416
Normal human anatomy	2,961
Instruments and apparatus	814
Microscopes	141
Miscellaneous	835

"Besides these, there are 375 specimens pertaining to normal human anatomy, and 726 to pathological anatomy, which are in what is called the 'provisional series.'

"At first the Army Medical Museum was limited to military medical subjects; but of late years its scope has been greatly broadened, and is now nearly the same as that of the Royal College of Surgeons. It includes human anatomy, physiology, pathology, somatological anthropology, instruments and apparatus, and illustrations of methods of teaching connected with special departments of practical medicine. It does not at present include hygiene or materia medica, except in their immediate relations to the military medical service; and this for reasons which will be stated presently. That our National Medical Museum should be broad and comprehensive in its scope, there can be no doubt, its requirements in this respect being quite different from those of collections formed and used more especially for the purpose of teaching medical students. The most practically valuable of these last are those formed by individual professors to suit their own specialties and methods of teaching. They need not, as a rule, be large. I may even say that they should not be large; for the labor of properly preserving a large collection is great, and the student, with his limited time and want of knowledge of what to look for, can examine but few specimens so as to profit by them. For the same reason specimens of rare abnormities, of double monstrosities, etc., are of little use in ordinary medical teaching as given in this country, and are not specially desirable in the museums of our medical schools.

"You may have noticed, that, in speaking of the scope of our museum, I said it included 'human anatomy.' This phrase does not mean that it has no specimens illustrating the structure of other animals, for it has many, and needs many more; but it means that in this department its main purpose is not to make comparative anatomy an end to itself by exhibiting all known variations in structure throughout the animal kingdom as a basis for their study in relation to development and environment, causation and results: in other words, it is not an anatomical museum, but a medical museum. The broad field of general biology, including natural history and comparative anatomy, will ultimately be covered by the National Museum; and in our medical collection it will be quite enough to illustrate human anatomy fully, using so much of the structure of the lower animals as will be useful in explaining why certain parts of the human body are thus and so, and not otherwise. No sharp line of distinction can be drawn between the field of work of the general and that of the medical museum. So far as morphology is concerned, they must necessarily overlap somewhat, since both want a certain number of the same specimens, although using them to illustrate different points of view.

"The kind of specimens most valued for illustrating anatomy in a museum is now very different from what was sought for in the first half of this century. Dried and varnished dissections showing blood-vessels, etc., are now looked on as nearly useless, and are kept only as historical relics. Elaborate dissections under alcohol, mounted in opaque dishes with flat glass covers, and sections of frozen bodies similarly mounted, are what the student and the practitioner most desire to see. In our museum there are some ex-

cellent specimens of this kind, prepared under the direction of Professor His of Leipzig, of Professor Cunningham of Dublin, and by our own anatomist Dr. Wortman. These, however, are only samples to show how the work should be done. We require several hundred such specimens to illustrate properly regional anatomy in relation to age and sex, while the possible applications of the same methods to the illustration of visceral displacements, hernias, and deformities of all kinds, are boundless. As regards physiology, but little can be done by museum specimens to illustrate function as distinguished from form and structure. The so-called 'physiological series' in the Hunterian collection is a series of organs illustrating variations in different families of the animal kingdom, or at different ages: in other words, it illustrates ontogenic and phylogenic development. The things students or teachers of physiology are most anxious to see in a museum are specimens of instruments and apparatus employed in experimental physiology, or in the measurement of the special work of different organs, or in illustrating lectures on physiology. Illustrations of results obtained in experimental pathology often belong quite as much to physiology; as, for example, specimens of results of Gudden's atrophy method.

"The Army Medical Museum has only a beginning of such an anatomical collection as I have indicated as desirable. Like all other museums, it is richer in specimens illustrating osteology than in any other branch of anatomy, simply because such specimens are the easiest to obtain and preserve. We are accustomed to think that human anatomy is nearly exhausted as a field for original research, and that, at all events, every important organ or muscle or nerve has been figured, described, and named. Granting this, so far as the adult is concerned, although it is by no means true even for him, we have still to study the development of each of these organs, or groups of organs, as seen at different ages, and, for some of them, in different races. As fast as these points are seen to be of practical interest, either in connection with diagnosis or the surgical treatment of disease, they are investigated; but an ideal museum should furnish the investigator the means for his researches, and it must therefore collect specimens without special regard to what is at present known to be their practical interest. The collection of such series of specimens of each joint, region, and organ, as I have in mind, including sections and dissections at different ages, from the earliest appearance in fœtal life to extreme old age in man, and in many cases in the lower animals, is a slow process. Such specimens, and especially such series of specimens, can only be prepared by a skilled anatomist, and there are few such: hence the formation of our ideal anatomical collection, limited though its scope may be, must be a work of time.

"Having obtained the specimens, the next difficulty is so to prepare and preserve them that they shall be available for study. The great majority cannot be preserved in such a manner as to retain their natural color, size, and texture. No doubt, more might be done in this direction than is usually done. It is possible to stain or paint portions of specimens in such a way as to give some idea of the normal appearances; but thus far, I think, experience shows that the best medium for the permanent preservation of wet pathological specimens is alcohol, and this will contract and harden most tissues, and remove the color from nearly all. It is also an expensive mode of preservation for large collections, and requires constant care to prevent the effects of evaporation. It does not follow, however, that such specimens are of little value, and that, as some have urged, it would be better to seek to obtain records of the results of disease by colored drawings or models. The pathological specimen, whether seen at the post-mortem, or years afterward in a museum, is, to the scientific pathologist or the practical physician, merely a sign or hieroglyph of the morbid process which has produced it: it is a result, in most cases, of interest not in itself, but because of the preceding phenomena which it connotes. As Sir James Paget has said, the same objection, viz., that museum specimens are unfit for the teaching or the study of pathology, might be made to the study of botanical specimens in an herbarium. 'In both cases alike, the changes produced by preparation are so far uniform that any one accustomed to recent specimens (and no others should study either herbaria or pathological collections) can allow for them or "discount" them. Just as an anatomist can discern, in a recent specimen of disease, the healthy structure, so, but often much more clearly, can the pathologist or any careful student discern in the prepared specimen the chief characteristics of the disease.' Colored drawings, casts, and models are of great value in supplementing original specimens, but they cannot wholly replace them.

"One of the most important sections of our museum is that devoted to microscopy, including normal and pathological histology and photomicrographic work. In the cabinets there are nearly 11,000 mounted specimens, illustrating almost every field of microscopical research. Many of these were made twenty years ago, and more, and were mounted by processes which have not given good results; so that Dr. Gray, who is in charge of this section, estimates that about 3,000 will be set aside as worthless; but the rest form a very valuable series, to which additions are being constantly made, and materials for which we are specially anxious to obtain. In connection with this section, a series of cultures of chromogenic and pathogenic bacteria is kept up for museum exhibits, and also to illustrate methods of work.

"While the great majority of the specimens in a medical museum have some relation to diagnosis, prognosis, or therapeutics, the number of those which are of direct interest to the so-called practical physician is not very great. It includes models and casts illustrating dermatology, morbid growths, the results of amputations, excisions, plastic operations, etc., and instruments, apparatus, dressings, etc., of all kinds. Here also may be classed hospital fittings and furniture, means of transportation for sick and wounded, model cases of instruments, emergency chests, etc. Our medical museum has a fair beginning of a collection of this kind, including over a thousand specimens; but many more are needed to make it reasonably complete. If each medical man who devises a stethoscope, a pessary, a speculum, an ophthalmoscope, or an electro-therapeutic appliance with which he is well pleased, would send a specimen to the collection, its increase would certainly be rapid, and it could always show the latest improvement.

"The Army Medical Museum contains what may seem a large amount of material relating to human osteology, and especially craniology, in its relations to North American ethnology, or the history of the development of different varieties of man on this continent; but it is not actually half large enough to permit of drawing definite scientific conclusions from it. The majority of the crania which it contains have been measured to a certain extent, and the results have been published; but many other measurements are desirable to permit of comparison with series taken elsewhere, and even measurements already made must be repeated by later and better methods. We have been trying some experiments with composite photography and superimposed contour tracings as a means of obtaining typical outlines and dimensions for race groups of crania, and these give promise of good results. If the collections of crania of North American Indians in Boston, New York, Philadelphia, and Washington could be brought together, a very much better average representation of the majority of tribes or groups would be obtained than can be furnished by either of these collections taken separately. By composite photography and tracings, combined with uniform methods of measurement, we can practically bring these collections together, and obtain results nearly as satisfactory as if we had them all in one room. We have also fitted up one large room with instruments and apparatus for anthropometry in its widest sense, including psychophysical investigation; and it is intended to make this a complete laboratory for illustration of methods of work.

"An important feature of our National Medical Museum should be to show methods of research and of instruction for the benefit of the investigators and teachers of the country. This includes instruments and apparatus, and, to a limited extent, illustrations of the modes of using them and of the results; it also includes diagrams, models, etc., used for illustrating lectures. For example: as soon as Koch's researches became known in this country, physicians, and especially medical teachers who visited the museum, asked if we could show them the apparatus used by Koch and Pasteur in bacteriological work, and eagerly examined the few specimens of cultures on solid media which we were able to exhibit. The anatomist comes to the museum quite as much to see methods of mounting and preservation as to see the specimens

themselves; the physiologist does not expect to see function directly exhibited, but he does hope to find information about kymographs and constant-temperature apparatus, and he wants to see whether Kühne's artificial eye is so useful for teaching purposes that he ought to get one to illustrate his lectures.

"Medical museums are not, as a rule, freely open to the public, nor are they collected or arranged with reference to interesting or instructing non-professional persons. The Medical Museum at Washington is the chief exception to this rule; and it is so, because it was placed in Ford's Theatre, the scene of the assassination of President Lincoln. Many visitors to Washington, both men and women, wished to see this memorable spot, and, in doing so, necessarily went through the museum. This gradually led to the adjusting of the specimens exhibited with a view to the fact that they were to be seen by a number of non-professional persons of both sexes. Certain groups of specimens were put aside and not shown, except to persons known to be physicians, while other groups were given prominent places because they interested the public, although not of great professional or scientific value.

"I have time for only a very condensed statement of the wants of our National Medical Museum. In the first place, it needs the intelligent interest and friendship of the medical profession of this country. To a very considerable extent it has had this. Were it otherwise, it would not be what it is, nor where it is. But it needs more of it, and it can never have too much. Every medical man in this country should help a little, and provide for the perpetuation of his name as that of a physician interested in the progress of the profession, by sending at least one specimen to it. It is omnivorous in its demands for material, as will be seen by the circular which it has recently issued. But I will name as special wants, human embryos, especially those of a very early age; monstrosities and malformations of all kinds in man or in the lower animals; results of old injuries, such as fractures or dislocations, or of surgical operations, such as excisions, stumps, etc.; injuries and diseases of the eye, ear, and nose; new growths of all kinds; diseases of the brain and spinal cord; and specimens illustrating the condition of bones, joints, brain, larynx, and other organs, in extreme old age.

"In the second place, it needs a regular supply of funds from the general government. To form and keep in proper condition such a medical museum as this should be, is a more difficult and expensive matter than those not acquainted with such work would suppose; and the gifts of specimens from the profession must be supplemented by ample means for the preparation, preservation, and proper display of these specimens, and also for the purchase of apparatus and typical specimens of foreign work, in order that the museum may be always able to show the latest state of knowledge and the best ways of doing things.

"The annual appropriation for the museum at present is $5,000. This is sufficient, except that the printing of the catalogue, of which I shall speak presently, must be an extra charge; but the medical profession should see to it that the amount is not reduced in the rhythmic spasms of partial economy with which some of our statesmen are afflicted.

"The third need of the museum is a series of the right kind of descriptions of its specimens, given on labels and in a catalogue. Unaided by such descriptions, it has for each man that which he can see in it, and no more. One man will see nothing but an old piece of bone, a shapeless mass of tissue bleached by alcohol, a case of old dingy brass instruments. Another will see in the same things a rare joint atrophy, implying curious abnormal nerve-influence; a leprous nodule, whose history, if we knew it, would reach back through the lazar-houses of the middle ages to the far east, and whose bacilli may be the lineal descendants of those that vexed Naaman the Syrian; a case of microscopes illustrating the development of that instrument, from the first rough iron tube of the spectacle-maker of Nuremberg, to the delicate and complicated instrument through which we now peer curiously into that world which lies within the world of unassisted vision. By our labels and catalogues we must tell men what to see, but to do this we must first see ourselves. The aphorism that a first-class museum should consist of a series of satisfactory labels with specimens attached, means a good deal. Something has been done in this direction, as you will see on inspection of the cases; but I often wonder what sort of labels a man who has spent years in investigating the normal and abnormal structure and relations of one organ would write for our specimen of that organ. Such help as this we need, — kindly, truthful criticism, the pointing-out of errors and of new points of view for this mass of material.

"We also need a series of printed catalogues. One of these should be in the form of compact handbooks relating to particular sections of the collection, and intended partly for the use of visitors while in the museum, and partly as a ready means of letting distant friends know what material it most needs in different departments. It should also print a complete illustrated catalogue of the whole collection, for the use of the investigators and teachers of the profession. Congress has been requested to grant authority for the printing of such a catalogue by the government printer. The material for it is nearly ready, and it would make three volumes, each the size of one of the volumes of 'The Medical and Surgical History of the War of the Rebellion.'"

A BIBLIOGRAPHY OF METEOROLOGY.

AS the literature of the several branches of science is increasing in volume, new scientific journals springing up every month, and valuable material being published in popular serials, bibliographical work comes to be an absolute necessity. This accounts for the numerous attempts at indexing the existing literature, and thus economizing the valuable time of scientists. A bibliography of any branch of science, once published, becomes the most fruitful source for further progress, as it is only thus that existing researches can be profitably made use of. Duplication of old work is avoided, and the compilation of the existing literature on a certain problem, which, without such an aid, is a source of indescribable annoyance and waste of time, is made easy. It is particularly in great scientific institutions, whose collaborators are numerous and frequently stationed in distant places, that, by the help of bibliographies of this kind, a large amount of labor and money is saved, the funds appropriated for their publication being thus well invested. The benefit to the advancement of science accruing from complete bibliographies is self-evident, and we need not dwell upon it.

The scientific bureaus of the United States Government have always been well aware of these facts. The great subject-catalogue of the Army Medical Museum, the bibliographies of the United States Geological Survey and of the Bureau of Ethnology, as well as those published by the Smithsonian Institution, testify to this; and their value is highly appreciated by all students, and has greatly aided the progress of science.

In this connection we may mention the 'Index to the Literature of the Spectroscope,' by Alfred Tuckerman, and that of the literature of columbium by Frank W. Traphagen, published among the Smithsonian miscellaneous collections. In an introduction to the former, Professor Langley well says, "With the rapid accumulation of scientific memoirs and discussions, published from year to year in numerous journals and society proceedings, a constantly larger expenditure of time and labor is required, by both the investigator and the student, to learn the sources of information and the condition of discovery in any given field. Hence is felt the growing need of classified indexes to the work done in the various fields of research, and hence the growing tendency of the age to supply such demand."

The great scientific societies consider these subjects among those calling for the most careful and immediate consideration; and thus the second of the bibliographies mentioned above sprung from the recommendations of the committee on indexing chemical literature, of the American Association for the Advancement of Science.

In meteorology the want of a bibliography is sorely felt. It is therefore with great gratification that we learn of the completion of the 'Signal Service Bibliography of Meteorology,' — a work anxiously looked for by all meteorologists and geographers. In its present form, it consists of a card-catalogue, which is in use in the bureau of the Signal Office. In his last annual report, General Greely, the chief signal-officer says, —

"The practical value of such a bibliography has been fully shown by its constant use in current office-work, and, in addition to the

official demands, almost daily calls for information have been received from parties not connected with the service. The result of this work is the collection of special bibliographies, which insures those consulting it a complete index of what has been accomplished in each special line of meteorology. As has been well said, the progress of meteorology is retarded, and labor therein wasted, owing to the impossibility of ascertaining what has been done in its various branches, — an experience which, as scientific men well know, is by no means confined to this science. The cost of time and labor to the government for the preparation of this work cannot be less than from twelve to fifteen thousand dollars; and the result of these labors has been the completion of a work which is of great value, both practically and scientifically, to the entire world. The catalogue in its present condition is valuable, and sufficient for the pressing needs of this service; but to view it in this light would evince a narrow and selfish disposition not in keeping with the scientific spirit of the age. At a cost of probably eight or ten thousand dollars, this work can be printed and distributed to the world as a monument and evidence of the growing scientific tendency of this nation. If such action is taken by Congress, the chief signal-officer has no doubt, from the willing spirit and hearty co-operation shown by leading scientists of other countries, that future international co-operation will secure by a system of rotation, from the various European governments, the publication of a series of supplements which will keep the world abreast of the steadily increasing volume of meteorological publications. A large number of American and foreign meteorologists and librarians have given largely of their time and energy in the compilation of this bibliography, as is shown by the fact that over one-half of the material has been contributed from foreign countries; so that the bibliography represents not only a large expenditure on the part of the United States, but also many years of additional gratuitous labor. The material could not be duplicated, and it would seem but a respectable reciprocity of exchange that the government should print the catalogue, so as to enable the voluntary contributors to avail themselves of the complete work. This fulfilment of obligations to contributors by a public catalogue is an act of justice; but, in addition, it should be considered that this bibliography will be of great practical value to the agricultural, commercial, engineering, and medical interests not only of the United States, but of the world."

The plan of this bibliography originated with Prof. Cleveland Abbe, who, in 1872, began a systematic collection of works bearing upon meteorology. Later on, he brought the matter to the attention of the leading European meteorologists; and at the meeting of the first meteorological congress, as well as at those of the international meteorological committee, it was indorsed, and steps were taken to carry out the plan. Dr. Hellmann and G. J. Symons were engaged in similar work; and at the Berne meeting of the international meteorological committee in August, 1880, letters of Dr. Hellmann were read, dated Jan. 20 and July 20, 1880, giving a detailed scheme for combining the various works and for the preparation of a catalogue, and embodying Mr. Abbe's proposal of August, 1879, as well as a similar one from Mr. G. J. Symons of London. The committee, however, resolved that each country be requested to furnish lists of observations, and that Messrs. Scott and Hellmann be a sub-committee to consider the means of carrying out Dr. Hellmann's scheme.

In the fall of 1881, Mr. Abbe wrote to Mr. Symons for more details as to his work. General Hazen, chief signal-officer, then decided to purchase the catalogues of both these gentlemen, with a view to their combination and completion by the Signal Office in case the international committee did not do this. In November, 1881, Mr. Symons was authorized to prepare, at the expense of the Signal Office, a copy of all meteorological titles in his collection; and in December, 1881, Mr. Abbe's cards were purchased.

Mr. Symons's catalogue was received in October, 1883; and on March 4, 1884, Mr. C. J. Sawyer, librarian of the Signal Office, was relieved from the care of the library, and, as bibliographer, ordered to devote his whole time to the completion of this work, which was then transferred from the library to the study-room division of the Signal Office.

At the second meeting of the international meteorological committee at Copenhagen, in August, 1882, Messrs. Scott and Hellmann reported that the Meteorological Office could not print the proposed catalogue, and that subscriptions were not practicable. They therefore recommended each meteorological service to publish a national bibliography, for which Hellmann's 'Repertorium der deutschen Meteorologie,' prepared in accordance with the ideas of the committee, and now just about to be published, should serve as a model. It need only be added that since 1882 the international meteorological committee have, with other meteorologists, acquiesced in the arrangement by which the Signal Service has undertaken to complete, and if possible publish, for its own and for general use, a general index to the literature of meteorology.

Up to April 12 of this year, Mr. Sawyer has been engaged on this bibliography, and his estimate of the number of independent titles, including the year 1881 (which date was adopted as the close of the bibliography), is fifty thousand. At that time he had finished the classification of these titles by subjects, and most of the subclassification, the author-index, etc.

Publications later than 1881 and prior to 1887 have been indexed, and will form a supplement, the work on which is almost completed.

So far, no provision has been made for the publication of this valuable work. The scientific as well as the practical value of the bibliography is so great, that its speedy publication is very desirable, even setting aside the danger of its being lost by accident to the building in which it is deposited. Once printed, it will result in a saving of time many times as great in value as the money required for its publication. Professor Abbe's endeavors have succeeded in making it a work of great magnitude, and one that will reflect the greatest credit upon the scientific and practical value of the work of our Signal Service.

SCIENTIFIC NEWS IN WASHINGTON.

Phenomenal Hot Wave and Mortality in Egypt. — Supplementary Reading in Public Schools. — The Annual Ring in Trees. — Temperance-Instruction in the United States.

Phenomenal Hot Wave and Mortality in Egypt.

THE United States consul-general at Cairo, in a despatch dated July 23, describes a condition of affairs, meteorologically, in Egypt this summer, that is really remarkable. He says, "On the night of the 15th of June a heat-wave spread itself over Egypt, and it has since remained continuously. In a residence of three summers here I have experienced nothing comparable to it. The days have given air like that from the blast of a fiery furnace, while the nights have been intolerable from heat. The death-rate throughout Egypt, which was already very high, suddenly mounted towards figures of decimation, and the destroyer has been reaping a great harvest of the dead. For the first week of this very hot weather the death-rate rose in Cairo from a little over 40 to 76.8. The next week it was 71.6; the next 79.1, succeeded for the fourth week by 77.7. These figures present the average. In Bodlac and Darb-el-Ahmar, two quarters of the city, the death-rate was respectively 103 and 86.5, in one case more than decimation, in the other very nearly decimation. Truly no Indian death-rate, except in periods of widespread and most fatal epidemics, reaches the present record in the Egyptian capital.

"For five years past the health of Cairo has been growing worse, and yet during these years a special detail of English sanitary experts has been supervising a khedival sanitary department, the main object of which has been to look after the health of the most crowded Egyptian communities. The sanitary administration costs the Egyptian Government annually about two hundred thousand dollars, not inclusive of publications and police service. The health of the large cities grows worse every year. The heavy summer death-rate begins earlier in Cairo than in Alexandria. Just now a decidedly increased mortality is prevalent in the latter, and, following precedent, it will be much greater in August. Last year the death-rate at one time in Alexandria was about equal to what it now is in Cairo. In some of the smaller cities the mortality has this year been greater even than the Cairo average, and about Damietta there has been typhus-fever of a very fatal character. The rise of the Nile produces great humidity, and during August,

September, and October no abatement of sickness may be hoped for. By the first of November a pleasing change comes, and from then until in the spring the temperature will be mild, the climate delightful, and health, for Egyptians, fairly good. It is gratifying, even under this burning sun and in hearing of these never-ending songs of death, to know that a season will come against which but few if any complaints may be entered.

"July 25. — The average death-rate for the week ended July 19, as shown in the health bulletin, reaches 97.2, while in Darb-el-Ahmer quarter it amounted to 126, and in Bodlac quarter to 100. Total deaths in this city were 685.

"The average maximum temperature for the same week was 106⅓° F.; extreme heat, 114½°. The average minimum temperature was 72⅓°; the extreme minimum, 72½°. The observations are taken at the Khedival Observatory, at Abbaseieh, two miles north of Cairo, where the unobstructed sea-breezes produce a lower temperature than in the city or south of it. Were it not for the great relief in temperature at night, existence would be unendurable."

Supplementary Reading in Public Schools.

With the single exception of industrial training, says the editor of the miscellaneous discussions that will accompany the forthcoming report of the United States commissioner of education, no innovation has been made in the schools within the last few years for which so much is claimed, and from which such far-reaching results are expected by practical educators, as supplementary reading. To form a taste for good reading, and thus overcome the evil influences of pernicious, cheap literature, is the highest object which it is hoped to secure; but, apart from this, the use of the works of standard authors in connection with the regular readers, furnishes, according to the testimony of many superintendents, an excellent means of testing the pupils' ability to read understandingly, and at the same time imparts an interest to school-work which nothing else can. In some cities not only standard books, but instructive and entertaining periodicals, are provided. This is the case at Canton, O., where the effects are thus described: —

"These periodicals were used for class-reading supplementary to the text-book, thus giving freshness, additional interest, and instruction in the reading-exercises. Pupils were allowed to take the papers home for evening reading, and were also permitted to use them during school-hours, providing they had any spare time after the preparation of their lessons. The teachers find this school literature a valuable help in moral instruction and in the intellectual culture of the pupils. Providing reading-matter so elevating in tone and so attractive is the best and surest way of overcoming the habit of reading the trashy, demoralizing literature of the day. There is marked improvement in taste for reading noticeable in many instances. Some pupils who were formerly addicted to dime novels and other sensational reading have voluntarily abandoned that since we are furnishing them something better. A knowledge of history, of current events, of familiar facts in science, and language-culture, are some of the benefits resulting from this work."

At San Francisco, Cal., "the principals as a unit want supplementary reading-matter."

The school committee of Southbridge, Mass., say, "Supplementary reading, which has been gradually gaining ground for the past three years, is one of the most advantageous results of the system of free text-books. Its beneficial effects are plainly visible."

From Steubenville, O., comes the following: "Supplementary readers have now been in use long enough to enable us to judge of the results. These are very satisfactory. The children can read in any book of the grade of their reader, and not merely in the one which they have learned by heart from hearing its lessons read over and over, as was so often the case when but one reading-book was used in a grade, and the reading is far better in every respect."

In New Haven, Conn., "the method of teaching pursued requires much independent reading by pupils, and so the habit of reading is formed. Moreover, as supplementary to the school reading-books, standard authors are being introduced, and are read somewhat critically. We can well afford to teach a little less of arithmetic, if by so doing we can insure a love of good books, and a habit of reading that shall be a life-long benefit."

The report of the committee on books and supplies at Lowell, Mass., mentions the subject thus: "With regard to supplementary reading for the different schools, a very small quantity was purchased, though, had your committee acted according to its inclination, a generous sum would have been expended in this direction, as it is assured of the good resulting from a plentiful supply of choice and suitable reading-matter for all the different classes."

The Washington, D.C., teachers are told that "the supplementary books, to be read at sight, are second in importance only to the text-books. They should be used at least for one exercise each week. This part of the reading will show the practical results of the efforts of the teacher and pupils."

The New York City superintendent says, "The good that has been already accomplished by these supplementary readers suggests a more comprehensive application of the same general idea."

A number of titles have been lately added to the list of books authorized for use as supplementary readers in the Boston, Mass., schools.

At Bay City, Mich., a pupil must carefully read at least two books of a prescribed list before he is entitled to promotion to the next higher grade.

The opinion of Mr. George Howland, superintendent of the Chicago schools, is thus expressed: "One of the most serviceable aids in the teaching of reading, enriching the pupil's vocabulary, widening the range of his thought, and strengthening his grasp of words and their meaning, is a wise use of the supplementary readers which to a limited amount have been in use in our schools for four or five years. With these books, in which most of the words, though familiar, are employed in other relations, with a few new words interspersed, the forms and meanings of the words are more permanently fixed in the mind, the alertness of thought in seizing upon the new words greatly quickened, and an ever-increasing interest and power, both of thought and expression, secured, admitting the pupils to more fruitful fields in the domain of history, literature, and science. No outlay of money, I think, can be more usefully incurred than in furnishing a sufficient amount of well-selected books for supplementary reading."

The Annual Ring in Trees.

The second annual report of Prof. B. E. Fernow, chief of the division of forestry, Agricultural Department, has just appeared. It is full of interesting information and suggestions. The following interesting extracts are made from a brief discussion of the annual ring of trees: —

"We may touch here only briefly upon the influence of the annual ring, and that especially for the purpose of asserting the existence of the latter as such in all timber grown in the temperate zone, and to call attention to the difference of structure of the annual ring in different groups of timbers, as from the appearance of the annual ring alone the quality of the timber may be judged to some extent. In this the following three factors are to be taken into consideration: the absolute width of the rings, the regularity in their width from year to year, and the proportion of spring wood to autumn wood. The spring wood is characterized by less substantial elements (vessels of thin-walled cells in greater abundance), while the autumn wood is formed by thicker-walled cells, which therefore appear of darker color. In the wood of conifers, and in that of deciduous-leaved woods in which the vessels (appearing as pores on a transverse cut) are most frequent in the spring wood, the annual ring is usually very distinctly visible; while in those woods which, like birch, linden, maple, etc., have the pores (vessels) evenly distributed throughout the annual ring growth, the distinction is not so marked. Sometimes the gradual change in appearance of the annual ring from spring to autumn wood, which is due to the difference of its component elements, is interrupted in such a manner that seemingly a more or less pronounced layer of autumn wood can be recognized, which again gradually changes to spring or summer wood, and then finishes with the regular autumn wood. This irregularity may occur even more than once in the same ring. Such double or counterfeit rings, which can be distinguished from the true annual rings by a practised eye with the aid of a magnifying-glass, have led to the notion that the annual rings are not a true indication of age. The cause of such irregularity may be sought in some tem-

porary interruption of the vigorous functions of the tree, induced by defoliation, for instance, or by extreme climatic conditions, such as sudden changes of temperature, cold days followed by sudden warm weather, or droughts followed by rain.

"The absolute breadth of the annual ring depends on the length of the period of vegetation; also, the deeper and richer the soil, and the greater the influence of light upon the tree, the more of formative material can be produced by the tree, and the broader will be the annual ring.

"In coniferous wood the width of the autumn wood, with cells of thickened walls, is almost the same in width as in narrow annual rings, while the more porous spring wood changes in width with the general width of the annual ring. Consequently, on account of the more frequent occurrence of heavy autumn wood in a given volume of narrow-ringed wood than in that of wider-ringed wood, such wood is heavier, and, as a rule, narrow-ringed conifer wood is the better. And, with certain limitations, the opposite is true for broad-leaved trees which have their vessels chiefly in the spring wood, while those with the vessels distributed through the ring are less influenced in their weight and quality by the width of the annual ring. Slow-grown conifers and quickly-grown hard woods furnish, therefore, as a rule, the best quality.

"Besides the temperature of the atmosphere and the moisture conditions of the soil, it is the amount of light and consequent development of foliage which is perhaps the most powerful factor in wood-formations, other considerations not being unfavorable. In the proper use of this factor mainly has the forester the means of regulating the slower or quicker development, and consequently the quality of his crop."

Temperance-Instruction in the United States.

In the autumn of 1887 the Bureau of Education at Washington, desirous of obtaining a knowledge of the present status of temperance-instruction in the United States, addressed the following inquiry to the State superintendents: "Is the study of physiology and hygiene with special reference to the effects of stimulants and narcotics required by law, and in what grades?" From the replies it appears that instruction in physiology and hygiene with special reference to the effects of stimulants and narcotics is made compulsory by statute, in some part of their school-life, on all pupils in twenty-five out of the thirty-eight States; viz., Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania, Delaware, Maryland, West Virginia, South Carolina, Florida, Alabama, Michigan, Wisconsin, Minnesota, Iowa, Nebraska, Kansas, Colorado, Nevada, Oregon, and California. The same compulsion exists in all the Territories and in the District of Columbia by United States statute. In Missouri the instruction under consideration is compulsory upon the demand of patrons of the public schools, and forbidden otherwise.

HEALTH MATTERS.

Seasickness.

NEW remedies for the prevention of seasickness continue to be brought forward. At a recent meeting of the Academy of Medicine of Paris, M. Bonnet presented the claims of antipyrine as a preventive. It was suggested, that as delegates from the academy to the meeting of the French Association for the Advancement of Science, to be held at Ivan, Algeria, were soon to sail for that place, an excellent opportunity to test the drug would thus be offered. M. Rollet, who went with the delegates, and who was exempt from seasickness, made a careful study of the subject, and contributes the results to the *Bulletin Médical*. The vessel sailed at four o'clock, and at six only four of the passengers remained at the table to finish dinner, although sixty had taken antipyrine, some of whom had begun the treatment three days before. He reports that antipyrine has no effect on seasickness.

In a previous number of *Science* we referred to another means to be adopted for the prevention of seasickness: to rub vigorously with the fingers the prominences behind the ears. An opportunity recently occurred to partially test this method. A party went for bluefish thirty miles off Sandy Hook. Two of them, at the first approach of the sickness, practised the rubbing and escaped; a third ridiculed it until thoroughly sick, and then gave it a trial, but without result; the others in the party were not sick, and of course had no occasion for the use of any preventive.

Still another remedy is oxalate of cerium. In a letter to the *New York Medical Record*, Dr. M. M. Waldron of Hampton, Va., writes, "The value of oxalate of cerium in seasickness has been known to me for years. Its application to this condition suggested itself from its supposed physiological action. . . . After repeated experiments on myself and others, I am satisfied that it will relieve more cases of seasickness than any remedy yet suggested. I have tested its efficacy both in coast and transatlantic voyages. Last summer I crossed the ocean with a party of friends. One of the number proved perverse, and would not take the remedy I offered. As the passage was somewhat rough, she was rewarded by being confined to her state-room during nearly the entire voyage. Another member of the party, hitherto a hopeless victim of seasickness, who had, in crossing the ocean fourteen times, made use of every known remedy without benefit, obtained decided relief from the oxalate of cerium. Two others, not 'good sailors,' took it regularly, from the time of going on board until the motion of the steamer ceased to be unpleasantly suggestive, and were kept from any serious symptoms, omitting, in all the passage, but one meal on a stormy night. The best results were obtained by fifteen-grain doses given every two hours. It can easily be taken dry on the tongue, and I belive this mode of administration is most effective."

Writing on this same subject to the same journal, Dr. W. H. Gardner, U.S.A., says, "I have been a traveller by land and water ever since I was able to toddle around, and have met many cases of seasickness, — in stages, ambulances, cars, boats, and ships, — and I can confidently assert that oxalate of cerium, administered in ten, fifteen, or twenty grain doses every two or three hours, in about one tablespoonful of water, will cure more cases than champagne, bromide of potassium, chloral, or any thing else I ever tried. I do not think I exaggerate when I state that it will cure, or materially relieve, seventy-five per cent of all cases that come up for treatment. . . . I have used the oxalate in hundreds of cases of sick-headache, and almost always with marked success; but it must be used in at least ten-grain doses for adults, to do any good. I have also found it very useful in relieving the cough of phthisis in these doses. I do not pretend to know its *modus operandi*, but believe it acts as a sedative to the pneumogastric and sympathetic system of nerves, and I have never seen any unpleasant effects from its administration in twenty-grain doses every three hours."

WARM AIR AT NIGHT. — Dr. Shepherd expresses in the *Lancet* the belief that consumption is due to a constant irritation of the air-passages, and that cold air breathed at night is one of the greatest irritants. Those who live most of the time in the open air are the least likely to suffer from phthisis, because their lungs are so accustomed to cold air as not to be irritated by it at night.

DISPOSAL OF GARBAGE IN BUFFALO. — A company has been incorporated at Buffalo for the purpose of manufacturing grease and fertilizers from the city refuse. The Vienna system has been adopted, and from twenty-five to fifty men besides teamsters will be employed. An ordinance requiring the separation of ashes and swill from garbage will be enforced, and the company will provide garbage-boxes, and collect, clean, and return them. The garbage will be removed in air-tight boxes and vehicles, and the factory is not expected to be in any way a nuisance.

CREMATION OF GARBAGE. — The Minneapolis Board of Health, after a study of the methods of garbage-disposal in Nashville, Chicago, and Milwaukee, has decided to construct a crematory for the burning of the garbage of that city. The furnace is expected to be smokeless, and to consume all solids and liquids. It is of a reverberatory construction, and receives the garbage on a grate some distance above an iron bottom plate that is intended to intercept and consume any falling material. The iron smoke-stack is to be one hundred feet high. The furnace is represented as no more of a nuisance on any street than a well-regulated livery-stable would be. In default of available municipal funds, the board of health has raised the necessary money among the citizens, and secured a remission of royalty upon the patent furnace. In connection with

the subject of garbage-cremation we note that the crematory at Milwaukee has been complained of as a nuisance, the odors from it being a cause of great annoyance.

COLOR-AUDITION. — Mr. J. A. Maloney, otacoustician, of Washington, D.C., communicates to the *New York Medical Journal* the results of some experiments which he has recently made with reference to the conductivity of sound-vibration by the bones of the skull. For this purpose the bone was clamped in a standard which was rigidly affixed to a base of iron weighing sixteen pounds. At one end of the bone was placed in light contact a button suspended upon a rod having a curved projection at its top to allow the button to swing clear of its support. The other end of the bone was gently struck with a small hard-rubber mallet, and the space through which the button was projected noted. The results upon different bones were as follows: frontal, very hard blow, slight disturbance of ball, without projection; occipital, the same; parietal, the same; ethmoid, less than the former; sphenoid, a very slight tap on one great wing gave great projection from the other wing, and scratching with or rolling of the mallet over the surface of one wing caused the button impinging upon the other to be agitated. The sphenoid was then made to communicate its vibrations to the diaphragm of a microphone in electric circuit with a telephone-receiver. In this test a very fine thread of silk, held at one end, was drawn lightly over the free wing, and the same could be heard distinctly in the receiving-telephone. Breathing gently through a tube against the wing would be heard in the receiver. The temporal bone was then substituted for the sphenoid; and the only point which gave results similar to that of the sphenoid was when the two tests were made upon that portion of the petrous or pyramidal process known as the jugular fossa. Mr. Maloney asks, May not color-audition, in view of the readiness with which the sphenoid bone takes up and delivers vibrations, be due to mechanical stimulation of the optic nerve by impingement of the same upon the sphenoid bone in its passage through the optic foramen? The phenomenon of color-audition was first brought to the attention of the scientific world by Dr. Nussbaumer of Vienna, who, when a child, was engaged with his brother one day in striking a fork against a glass to hear the ring, when he discovered that he saw colors at the same time that he perceived the sound; and so well did he perceive the color, that, when he stopped his ears, he could divine by it how loud a sound the fork had produced. Dr. Nussbaumer was afterward able to add to his own observations nearly identical ones made by a medical student in Zürich. Later on, M. Pedrono, an ophthalmologist of Nantes, observed the same peculiarities in a friend. In these cases musical sounds gave sensations varying the color according to the instrument played upon, thus showing the dependence of the phenomenon upon the timbre. For instance, the saxophone gave yellow sensations; the clarionet, red; the piano, blue. When numbers and words were used, the following results were obtained in cases mentioned in an article, 'Color of Words,' by E. A. Newell (*Popular Science Monthly* for December, 1887): 1, black; 2, light cream; 3, dark cream; 4, brownish red; 5, black; 6, tan-color or cream; 7, greenish black; 8, dark straw; 9, mud-color; 10, black; 11, black and straw; 12, light cream; 13, dark straw-color; 14, light brown. Following are some familiar names, and the color of each, and also the letters of the alphabet: Mary, dark red; Abbie, tan; Lucy, dark blue; Richard, light gray; Atlanta, steel-gray; Charlotte, light red; Claire, light blue; Newcomb, dark red; Lincoln, black; Morse, brown; A, light straw; B, gray; C, tan; D, blue; E, black; F, black; G, light straw; H, red; I and J, black; K, blue; L, black; M, brown; N, dark blue; O, light red; P, light green; Q, blue; R and S, light straw. Henri de Parville, in the *Popular Science Monthly* for August, 1883, and previously in *Le Monde de la Science et de l'Industrie*, says, "Popular expressions are often significant. 'I saw three dozen lights of all colors,' or some such expression, may frequently be heard from persons who have received violent blows on the head or face. Under the influence of shocks of this kind, the eye seems to see infinite numbers of sparks. Shocks of a certain class impressed upon the nervous system seem to have the faculty of producing phenomena of light. There are persons endowed with such sensibility that they cannot hear a sound without at the same time perceiving colors. Each sound to them has its peculiar color: this word corresponds with red, and that one with green; one note is blue, and another is yellow."

ETHNOLOGY.

Tattooing.

MISS A. W. BUCKLAND, in the *Journal of the Anthropological Institute* of Great Britain, publishes a study of the distribution of the custom of tattooing. Although her list of tribes who practise this custom might be considerably increased, some of the results of her study are of great interest. She distinguishes two methods of tattooing. In the one, cuts are made in such a manner as to leave a scar; in the other, patterns are pricked out, and coloring-matter is rubbed into the wounds. According to Miss Buckland, the former method, which she calls 'gashing,' is confined to Africa (excepting Egypt), some parts of southern Europe, and Australia, including a few of the neighboring islands. Tattooing, in the proper sense of the word, is practised in Polynesia and all over the American continent. The most beautiful patterns are found in New Zealand and among the lower classes of Japan. The author calls attention to the widespread custom of marking the chins of women as denoting marriage. The distribution of the custom of tattooing is more fully illustrated in Gerland's excellent ethnological maps, which are being published in Berghaus's 'Atlas of Physical Geography.' He distinguishes between tribes tattooing both sexes and those tattooing the women alone, which is most extensively practised by the natives of Arctic America and the east coast of Asia. The student of this problem will find material of the greatest value in W. Joest's work on tattooing, gashing (or, as he calls it, 'drawing by means of scars'), and painting the body. The plates, which form the most important part of the work, are beautifully done, and deserve the more praise, as they must be considered absolutely reliable. Joest emphasizes justly that it is necessary to take the most painstaking care in reproducing ornaments of this kind. It is necessary for the artist to understand the intentions of the native tattooer or draughtsman, in order to render his work correctly. As this precaution has frequently not been taken by travellers, many drawings of works of native art are mere caricatures. Fortunately the necessity of the greatest care in making collections of this kind is well understood at present. Joest arrives at the conclusion that tattooing has no connection whatever with the religion of the tribes who practise it, but that it is chiefly ornamental. Miss Buckland is of a similar opinion. She says that tattooing is generally ornamental, and that it seems to be in the men honorable, denoting bravery in battle. Tattoo-marks are, as a rule, geometric designs. There are only a few tribes known among whom conventionalized animal forms are used, denoting the totem of the bearer. Among these are the Haida of the Queen Charlotte Islands, the tattoo-marks of whom were first described by Swan. Several of their neighbors practise the same custom. Joest's book contains a partial bibliography of this subject. The etchings and plates which accompany his book refer principally to Melanesia and Polynesia; but, besides this, tattooing from Tunis, a beautiful specimen from Japan, and several from Central Africa and Burmah, are given.

A RECENT DISCOVERY IN EGYPT. — Prof. A. H. Sayce, in the August number of the *Contemporary Review*, describes an archæological discovery of great interest, made recently in upper Egypt, where a large collection of clay tablets, inscribed with cuneiform characters of a cursive Babylonian form and in the Babylonian language, have been found at Tel el-Amarna. They consist, for the most part, of letters and despatches sent by the governors and kings of Palestine, Syria, Mesopotamia, and Babylonia, to two Egyptian monarchs, Amenophis III. and Amenophis IV. Five of the letters are from Babylon, the date being about B.C. 1430, which approximately fixes the period to which the reign of Khu-en-Aten must be assigned; but the largest number refer to the mother of the latter, who was the daughter of the King of Naharina. This place is proved by the tablets to be situated on the eastern bank of the Euphrates. The unexpected revelation of active literary intercourse from one end of the civilized East to the other, in the century before the date assigned by Egyptologists to the Exodus, is likely to produce a revolution in our conceptions of ancient Oriental history. It

is needless to point out what an interest it possesses for the student of the Old Testament, or what important bearings it is likely to have upon the criticism of the Pentateuch. The most unexpected part of the discovery is the fact that the medium of literary correspondence was the Babylonian language and script. It is true that here and there we come across evidences that the writers were not of Babylonian origin, as when the king is called a 'sun-god,' in accordance with Egyptian ideas, or when the first personal pronoun is expressed by the Phœnician *anuki* instead of the Assyro-Babylonian *anaku*. But the language of Babylonia is generally correctly written, and the scribes show that they had acquired a very thorough knowledge of the complicated cuneiform syllabary. It is evident not only that good schools existed throughout western Asia, but an acquaintance with Babylonian literature as well. We can now explain the presence of the names of Babylonian deities, like Nebo or Rimmon, in Canaan, as well as the curious resemblances that exist between the cosmologies of Phœnicia and Babylonia. Perhaps the most important result of the discovery is the evidence it affords us that some parts, at any rate, of the books preserved in the libraries of Canaan, were written in cuneiform characters, not upon papyrus, but upon imperishable clay. There is therefore some hope that when the excavator is able to exhume the buried relics of cities like Tyre or Kirjath-Sepher, 'the town of books,' he will find among them libraries similar to those of Assyria or Babylonia. Not only do we now know that the people of Canaan could read and write before the Israelitish conquest, we also know that they wrote upon clay. The 'scribes' mentioned in the Song of Deborah (Judges v. 6) have become to us living realities. The discontinuance of the old literary intercourse, and of the international language and script which accompanied it, must have been due to the advance of the Hittites and their long wars with the Egyptians, followed by the Israelitish invasion of Palestine. Western Asia was for a time a scene of bloodshed and disorder; Egypt had fallen into decay, and the cultured populations of Canaan were struggling for life and home. On the north were the Hittite tribes; on the south, the children of Israel. When order began to reign again, the influence of Babylonia had passed away, and its cumbrous syllabary had been superseded by the simple Phœnician alphabet. The date at which this was introduced into Phœnicia has now to be fixed by the progress of archæological research.

ELECTRICAL SCIENCE.

Disruptive Discharges and their Relation to Underground Cables.

THE paper read by Mr. E. G. Acheson before the National Electric-Light Association, on the above subject, was the most valuable contribution to our knowledge of underground cables that was given at the last meeting of the association. The object of the experiments described by Mr. Acheson was to find out under what circumstances the insulation of a wire carrying a high-tension current would be pierced by a spark. Some previous experiments on the discharge between points in air led to the equation

$$d = \frac{(\text{E.M.F.})^2 \times (\text{Capacity})}{a},$$

where d is the spark-length, and a is a constant for the dielectric, the capacity being expressed in micro-farads. For air, a was taken as 135, and d was expressed in inches. As the conditions which actually occur in practice are not discharges between two points, but between the cylindrical surface of the wire and some point outside the insulation, experiments were made to determine the value of a with this arrangement and with different dielectrics. The results give, in general, a greater value of a than when the points alone are used.

Dielectric.	Spark between.	a
Air	Points	135
Air	Point and wire	263
Paraffine and cotton	Point and wire	5,822
Ozite and cotton	Point and wire	7,759

To find what effect cracks in the insulation would have, Mr. Acheson took a broken plate of glass, the two parts of which were held firmly together. With a high electro-motive force, there was no discharge between two points on opposite sides of the glass when the solid part of the plate was between; but, when the points came abreast the crack, there was a spark. Another interesting experiment showed that a disruptive discharge, due to the breaking of a high-tension cable, would rather go through the insulation than through an electric arc.

To avoid any chance of a disruptive discharge through the insulation of the cable, especially if the latter be lead-covered, Mr. Acheson suggests that a wire be twisted around the outer lead covering, and the point be brought near to the bared surface of the conductor, the distance between them being adjusted until the discharge would pass between the conductor and the point rather than through the insulation.

In concluding his paper, the author says, "It is safe to predict, that, the disruptive discharge being provided for, little or nothing more would be heard of the much-talked-of pin-holes in the lead, and the moisture-absorbing terminals; the undergrounding of arc-light cables would become a thing of certainty, and our municipal governments relieved of a great bugaboo.

THE RECHNIEWSKI ALTERNATE-CURRENT MOTOR. — The adaptability of alternating currents for distributing light over an extended area has led a number of inventors to attempt to devise an electric motor that can be used on such circuits. The motor of Mr. Tesla, which has been described in this journal, is one of the most ingenious attempts in this direction, although there is yet considerable doubt as to its efficiency and regulating properties and its adoption would necessitate a complete change in the present method of distribution. It has been known ever since any attention was called to the subject, that an ordinary series motor would work on an alternating-current circuit, and Mr. Kapp has pointed out that a condition of maximum output is that the self-induction and counter electro-motive force of the motor should be equal. M. Rechniewski's motor is of the inverted Edison type, the field-magnets and armature-core being both built up with thin iron plates. The armature is of the drum type, and is large compared with the field-magnets. No data as to the performance of the motor are obtainable, but the following figures, taken from the *London Electrician*, give some idea of its construction: —

Volts at terminal	115
Current in ampères	100
Revolutions per minute	1,400
Diameter of armature	8 in.
Peripheral velocity in feet per minute	2,800
Weight of iron in field	440 lbs.
Weight of iron in armature	108 lbs.
Section of iron in field	42.5 sq. in.
Section of iron in armature	33.5 sq. in.
Induction in armature	3,700,000 lines.

The motor is not self-regulating, but it can be governed in the same way as some of the continuous-current motors.

MEASUREMENT OF ILLUMINATION. — M. Mascart has invented a photometer that enables him to compare the illumination produced by two sources of light. The standard lamp illuminates a plate of ground glass, an image of which, formed by a lens, is thrown after two reflections on a second plate of ground glass, called the 'test-glass.' The general diffused light of the room to be tested illuminates a translucent screen, the rays emitted from which are reflected at an angle of forty-five degrees, and fall on the other half of the test-glass. The light from either source can be more or less cut off by sectors. In lighting similar rooms of different sizes, it would appear at first that the source of light should vary in intensity with the square of the dimensions. It is found in practice, however, that the quantity of light varies as the cubic contents of the room. We may, from a consideration of the limiting distance at which a source of light ceases to be effective, get an idea of mean illumination. If, for instance, the limiting distance is ten metres, and the mean illumination one carcel at one metre, then the illumination should be .16 of a carcel per cubic metre. Comparing the illumination of public buildings during this century leads to the conclusion

that the public demands a much brighter illumination than formerly, and this increase of illumination has by no means reached a maximum.

A NEW INSULATING COMPOUND. — The following, from the *Electrical World*, is taken from the *Chronique Industrielle:* "The compound is composed of one part of Greek pitch and two parts of burnt plaster by weight, the latter being pure gypsum raised to a high temperature and plunged into water. This mixture, when hot, is a homogeneous viscous paste, and can be applied with a brush or cast in moulds. It is amber-colored, and possesses the insulating properties of ebonite, and can be turned and polished. Its advantage is its endurance of great heat and moisture without injuring its insulating properties."

SPECIFIC RESISTANCE OF MERCURY. — Since the absolute unit of electrical resistance has been defined in terms of a column of mercury of one millimetre cross-section and of a given length, a number of determinations of the specific resistance of mercury have been made. The latest is by Messrs. Glazebrook and Fitzpatrick, and gives for a result that the resistance of a column of mercury one millimetre in cross-section and one metre long is $r = 0.95352$ B. A. units. The other results that have been obtained are —

Observer.	Date.	Value for r in B. A. Units.	Value of Ohm in Centimetres of Mercury at 0°.
Lord Rayleigh and Mrs. Sidgwick	1883	0.95412	106.23
Mascart, Nerville, and Benoit	1884	0.95374	106.33
Strecker	1885	0.95334	—
L. Lorenz	1886	0.95388	105.93
Rowland	1887	0.95349	106.32
Kohlrausch	1888	0.95331	106.32
Glazebrook and Fitzpatrick	1888	0.95352	106.29

ELECTRIC TRAMWAYS IN SALT-MINES. — In the new Stassfurt mine an electric tramway has been in operation since January, 1884. It was built by Siemens & Halske, and was a success from the start. The engine is of 20-horse power, and is placed above ground at the mouth of the shaft. The dynamo is compound wound, and gives about 40 ampères at 300 volts. The current is taken through cables to the tram-line, a distance of 410 metres. The motor is supplied from overhead iron conductors, insulated from the ground. The motor is simply one of the well-known type of Siemens dynamos, placed horizontally on a car to economize space. The dynamo supplies about 20-horse power of energy; the motor gives about 10-horse power, — an efficiency of only fifty per cent. The weight of the wagons to be drawn is about 2,500 pounds, and there are sixteen in a train. The mean speed is about six miles per hour. This line is not in any way so efficient as those that can be put up to-day, but some figures as to the cost of working are of interest, especially as the road has been long enough in operation to allow an accurate estimate to be made. In 1884, 176,196 trucks were handled; and the working cost, including all items, wages, fuel, etc., with fifteen per cent for interest and depreciation, was 10.1 pfennig (about 2½ cents) per truck, while the cost before had been 20 pfennig (5 cents). In 1887 the figures are still more favorable, as the underground electric way had been considerably increased. The cost was 8.3 pfennig (about 2 cents) per truck, or 12.92 pfennig per kilometre ton, as compared with 34.2 pfennig per kilometre ton by human labor, which the electricity displaced. If the few electric tramways in mines that are now in operation in this country were investigated as to cost, it would be found that their economy is as great as that given above. It is only a question of a few years when mule and man power in mines will be replaced by electric motors.

MICHEL EUGENE CHEVREUL, the chemist, entered his hundred and third year on Aug. 30. He is still active, and a few days ago was able to visit the Sanitary Exhibition at the Palace of Industry.

BOOK-REVIEWS.

Eclectic Physical Geography. By RUSSELL HINMAN. Cincinnati, Van Antwerp, Bragg, & Co. 12°. $1.

"THE aim of this book is to indicate briefly what we know or surmise concerning the proximate causes of the more common and familiar phenomena observed at the earth's surface. Even thus restricted, the field of inquiry encroaches to a greater or less extent upon the domains of all the branches of science. Since the study of physical geography precedes that of the sciences in most of our schools, it has been thought advisable to present, in the form of an introductory chapter, a condensed statement of the more important and fundamental scientific conceptions regarding the properties and phenomena of matter and energy, such as inertia, gravitation, cohesion, affinity, and heat, light, magnetism, and electricity."

This passage, taken from the preface, shows the scope and object of the volume under review. The different parts of the subject are treated in the order used in all books of this character. Mathematical geography forms the first part. This is followed by meteorology, oceanology, geophysics, and biology. The book is illustrated by many maps, in which the most recent discoveries and researches have been made use of, and which, considering their smallness, are quite satisfactory, and undoubtedly superior to those defacing most American text-books of geography. In a number of maps the author has preferred to omit the system of meridians and parallels; it seems to us, not to the advantage of these maps. The great number of maps, and the fact that they are copied from the best authorities available, make the book very useful to the student. The chapters on meteorology and geophysics are the best parts of the book, while in that part treating of the oceans we find many statements that are not entirely in accord with the views held by the best writers. We particularly object to the method of the author of describing theories advanced by individual authors, but not generally accepted, — for instance, Murray's theory of the origin of deep-water deposits, and Ferrel's theory of ocean-currents, — as firmly established facts. A book of the character of this 'Eclectic Physical Geography,' if giving as much theory as the present one does, ought to give the views of opposing parties, and not favor one to the exclusion of another. In Part IV. the author gives first an outline of the topography of the earth, which is generally not treated in books of this character. After a brief treatise on weather and climate, the forms of life are discussed. It seems to us that the author, in this the last part, does not do full justice to his subject, his treatment being too brief, and his views not quite clear in all respects. Evidently it is his opinion that the principal part of geography consists in the study of geophysics. The book is, on the whole, well adapted to be used in the higher grades of teaching geography, although it might have been better to treat theories less dogmatically.

The Chemical Analysis of Iron. By ANDREW ALEXANDER BLAIR. Philadelphia, Lippincott. 8°. $4.

IN this book Mr. Blair describes those methods of analysis which, in his extended experience, he has found to be of most value to the iron-chemist. The first twenty-two pages of text are devoted to the description of the necessary and most suitable apparatus; twenty-one pages treat of the re-agents; then follow detailed methods for the analysis of iron and steel, iron ores, limestone, clay, slags, fire-sand, coal and coke, and furnace gases; tables to facilitate the calculation of analyses follow; and the book ends with a very complete index.

The work is well done, the arrangement good, the descriptions clear and to the point, the illustrations excellent. It forms a manual which must prove of the greatest assistance to those entering this field of work, while those who are already familiar with this branch of technical analysis will find it a convenient reference-book, and doubtless gain from it a number of valuable suggestions.

In Fresenius's 'Quantitative Analysis' (sixth German edition) fifty-two pages of the 'Special Part' are given to methods for analyzing iron and iron ores, and Bolley's 'Handbuch' contains seventy-seven pages on the same subject; but this is, so far as we are aware, the first complete work containing between its covers not only all the best methods for the analysis of all materials directly

connected with the iron-industry, but also descriptions of the apparatus and manipulations especially adapted to the work.

A fuller discussion of the advantages and defects of the several methods given for the determination of a single element would have added to the user's satisfaction.

One is surprised to find in a work so excellent a table of atomic weights in which recent recalculations and redeterminations are ignored. According to this table, Al=27.5, Sb=122, Mn=55, Pt=197.18, etc. The error naturally extends to the table of factors, which are calculated on the basis of these atomic weights. Thus the factor for Al from Al_2O_3 is .53398, instead of .53010 as it would be with Clarke's value, Al=27.075 (O=16).

The mechanical execution of the book is, on the whole, superior to any thing we have had the good fortune to see in the way of laboratory handbooks. Heavy, fine paper, admirable press-work, and a party-colored binding make the book pleasant to the eye and hand, and — expensive. It is indeed almost too fine and costly to expose to the rude chance of laboratory disfigurement. It may be, however, that author and publisher hope, through its full-dress appearance, to promote a feeling of greater respect for nicety of manipulation in the chemists into whose hands it may come.

The book is unusually free from typographical errors; but we notice a slip of the proof-reader's on pp. 55, 56, 57, and 63, where the references to Fig. 45 should read H instead of D.

First Lessons in English. By F. B. GREENE. Philadelphia, Cowperthwait & Co. 16°.

ONE of the most difficult studies for most young persons is grammar. A few, whose minds are fitted to readily grasp abstract ideas, learn it easily and with pleasure; but to the majority it is at first irksome. This is partly due to the habit of English grammarians of laying down a mass of rules borrowed from the classical languages, and having but little application to our own tongue; but it is also in part due to the abstract and formal character of grammatical treatises, which are ill adapted to the minds of children. To remove this difficulty and make the introduction to grammar easier, books have been prepared of late years on the inductive principle, and teaching the rudiments of the science by example. Rules and technical terms are very sparingly used, and the pupil is taught the parts of speech and the construction of the sentence in so simple a way that he can hardly fail to understand them. The book before us is one of this class, and, though nothing but actual use in the classroom can accurately test its value, it seems to be well adapted to its purpose. It is illustrated, so as to make it attractive to very young pupils; and the lessons and examples are of the simple character that such pupils need. Such a work is certainly a great improvement on the elementary grammars of former days.

Old and New Astronomy. Parts I.–V. By RICHARD A. PROCTOR. London and New York, Longmans, Green, & Co. 4°.

THE present work, the first instalments of which have reached us, is intended to give an account of the science of astronomy and of its history to the general student. The work is admirably adapted to this purpose, Proctor's theories and arguments being set forth very clearly, and being illustrated by numerous good and very instructive cuts, which pre-eminently enhance the value of the book. In a brief introduction the author states his object. "It is as a subject for study and contemplation as a means for training and exercising, but likewise for ennobling and purifying the mind, that astronomy should be studied by all. It is the celestial science as viewed and studied by philosophers, as Newton and Herschel, that I propose to contemplate in the present volume." In the first chapter the history of the methods of observing heavenly bodies is described, in which discourse Proctor expounds his curious concept that the Egyptian pyramids were nothing else than immense observatories. The development of these methods is traced up to the present time. The next chapter contains studies of the earth's shape. The various proofs of the earth's curvature are explained by novel figures, among which we call attention to the telescopic view of a 'hull down' ship seen indistinctly beyond the sharply defined horizon, thus proving that it is farther distant than the horizon. In the discussion of the sun, moon, and planets, their apparent motions are first treated; and after an exhaustive explanation of the ancient theories, and the paths of the planets relatively to the earth, supposed to be at rest, Kepler's system is described and explained. Of particular interest is Proctor's elementary deduction of the perturbing action of the sun on the moon, which is used in explaining the cause of the tides. The fifth instalment treats of the methods and results of measuring and weighing the solar system. The book is very beautifully printed, and the instalments are following each other very rapidly. The matter is treated very attractively, and the mathematical deductions, which are contained in notes, are so arranged as to be intelligible to anybody who has an elementary knowledge of it.

NOTES AND NEWS.

RICHARD ANTHONY PROCTOR died in this city on Sept. 12, of yellow-fever, which he had contracted in Florida. Proctor was born at Chelsea, England, on March 23, 1837. Early in life he devoted himself to astronomy, and was a very fruitful writer. His first book was on 'Saturn and its System.' In the United States he is largely known to the public through his lectures, which he delivered in most of the larger cities. His first visit to our country was in 1873–74. He was eminently successful as a popular writer, and knew well how to make the difficult problems of astronomy attractive and intelligible to the general reader. His last work, 'Old and New Astronomy,' which is being published, is a splendid specimen of his enthusiasm for his science and of his success in imparting it to his readers.

— The Appalachian Mountain Club plans an excursion to Mount Washington, Mass.; the party, which will be limited to fifty in number, to leave on Friday morning, Sept. 28.

— E. Dubois read recently, before the French Academy of Sciences, a paper on the satellites of Mars which were discovered in 1877 by Asaph Hall. It appears remarkable, that notwithstanding the numerous observations of the planet, and notwithstanding their rapid motion and close proximity to it, they were not discovered sooner. Dubois believes that such would undoubtedly have been the case if they had existed. He expresses the opinion that two of the telescopic planets which occupy the zone between Mars and Jupiter approached the former so near that they have become its satellites. He also says that several others of these bodies may become satellites of Mars in course of time.

— F. S. Mansfield, attaché to the United States Legation in Japan, visited the scene of the eruption of the Bantaisan in Japan, of which a full report was given in the last issue of *Science*. His account, which was printed in the *Atlanta Constitution*, Aug. 26, contains the following additional details: On Sunday, the 15th of July, rumblings were heard and earth-tremors felt in the vicinity of the Bantaisan. The first disturbance noticed occurred at about 7 A.M., and was followed by three earthquake shocks at intervals of ten minutes, when there occurred a loud explosion, the noise of which the people compared to the report of thousands of cannons discharged simultaneously. At 10 A.M. the eruption was at its height, and by 4 P.M. it was over. The Japanese Government has set up a temporary hospital in a schoolhouse for the treatment of the wounded, and has organized a relief committee to look after the homeless and to recover the bodies of those who had been killed. The number of people who lost their lives by the disaster was, according to the official statement from the government relief station at Inawashiro, 518, the bodies of 70 of whom had been found, while 41 persons had been injured, and were then in the hospital at Inawashiro. The eruption occurred on the eastern side of the principal peak of Bantaisan. A portion of the smaller peak was carried away. The mud then filled up the side of the mountain, not only on the eastern side, but on the northern side as well, running down in a stream to the valley below. At the foot of the mountain each stream was about half a mile wide, gradually narrowing toward the top. The main eastern stream was divided about halfway up the mountain by a ridge, and came down in two separate volumes, the one continuing east, while the other branch came down on the southern side of the mountain, the latter stopping in the very small hamlet of Minemura, which was partially destroyed by the mud covering completely some of the houses.

The amount of mud thrown out by the volcano is beyond all calculation, as all the streams reach from the top to the bottom of the mountain, a distance of four or five miles. There was no lava thrown out. The greatest number of lives lost was on the northeastern side, on account of that side of the mountain being the location of several hot-springs resorts, and owing to the fact that the first discharge ran down on that side. At Nagasaki, a small hamlet near the volcano, a great number of lives were lost by a flood, which it appears was occasioned by the damming-up of the creek on which the hamlet is situated. The darkness which occurred at the time of the explosion extended for some ten or fifteen miles, and very small particles, like mist, fell much further.

— The sealer 'Jason,' says *Nature*, has arrived in Norway from the Greenland coast, and reports that the expedition under Dr. Fridtjof Nansen, which is to cross Greenland from east to west, left that ship on July 17 in latitude 65° 2′ north. An ice-belt about ten English miles in width separated the ship from the shore, but it is believed that the members would have no trouble in crossing this, the floes being large. Dr. Nansen intended to land in the Sermilik Fiord, which is inhabited. Previous attempts at landing had failed on account of rain and fog.

— Paper relief-maps for teachers of geology and physical geography, designed by Prof. William M. Davis of Harvard College, for use in his lectures to students and teachers, are advertised by J. H. Emerton, 11 St. James Place, Boston, Mass. Being made of paper, they are much lighter and stronger than plaster relief-maps, weighing only one or two pounds each, so that they can be held in the teacher's hand, hung on the wall, or used in any position desired. They are large enough to be seen across the largest school-room, — about three feet long, a foot and a half wide, and from two to four inches high. The development of a river in a plain is shown in five maps; the development of rivers in a broken country, in three maps; a river traversing a mountain (Uintah Mountains), in two maps; the development of zigzag ridges (Appalachian Mountains), in two maps; the changes in the rivers of a country, caused by glacial drift (Canadian drainage), in two maps; river-terraces (New-England drainage), in three maps; changes in the position of divides, in three pairs of maps; and a volcano series, in six maps.

— The New York Mineralogical Club took excursions, Sept. 8, to Inwood, N.Y., and Saturday, Sept. 15 (probably the closing trip of the season), to Hoboken, N.J.

— We have received the prospectus of the Massachusetts Society for promoting Good Citizenship, and also a list of works on civil government which its committee on reading recommend. The object of the society is declared to be, "to disseminate a knowledge of the principles of good citizenship, and to promote the observance of the duties imposed thereby," and especially to encourage the study of political history and political philosophy. With this end in view, a committee has been appointed to examine the various text-books and other works on political science, and give the results of their examination to the public. The first of their reports is now before us, and is a description and criticism of works on the national and state governments of this country. The judgments of the committee are thoroughly independent, and, so far as we can judge, judicious. They evidently do not mean to recommend a worthless book; and their comments on the various works examined by them cannot fail to be useful both to teachers and to private students. Persons wishing to join the society may address the secretary, C. F. Crehore, M.D., 87 Milk Street, Boston.

— The October number of *The Chautauquan* contains 'Gossip about Greece,' by J. P. Mahaffy of Dublin University; 'Greece and Modern Civilization,' by Herbert B. Adams and William P. Trent of Johns Hopkins University; 'Solon, the Athenian,' by Thomas D. Seymour of Yale University; 'Greek Mythology,' by James Baldwin; 'The Circle of the Sciences,' by Prof. A. P. Coleman of Victoria University; 'Philanthropy,' by Prof. Richard T. Ely of Johns Hopkins University; 'The Policy of Russia in the East,' by C. K. Adams, LL.D., president of Cornell University; 'Memories of Professor Baird,' by G. Brown Goode of the National Museum; 'Yucatan,' by J. Hendrickson M'Carty, D.D.; 'Engineering Feats in the West,' by Ernest Ingersoll; 'Mound-Making Ants of the Alleghanies,' by Dr. H. C. McCook; 'On a Bronze Buddha at Washington,' by Charles de Kay; and 'The Possibilities of Culture,' by Bishop H. W. Warren, LL.D. —— The September *Cosmopolitan* was published this month on the 10th. Besides its principal attractions, is 'The Adventures of a Lion-Tamer,' a graphic story of Barnum's trainer of wild beasts. —— Prof. Arthur T. Hadley's article in *Scribner's* for October, on 'The Railroad in its Business Relations,' will throw much light on the questions of rates, pooling, and government control. —— The publishers of Worcester's dictionaries, J. B. Lippincott Company of Philadelphia, announce that they have ready an entirely new edition of their 'Academic Dictionary.' While this book is a revision of their well-known 'Academic Dictionary,' so many new features have been introduced that it was found necessary to reset the type entire. The 'New Academic' presents as a new feature the etymology of words. In orthography great attention has been paid to usage, analogy, and etymology in deciding disputable points. In pronunciation the book not only gives the preference of Dr. Worcester, but exhibits at the same time that of the leading lexicographers. The same publishing firm also announce a new edition of the 'United States Dispensatory.' The revision has been thorough, and not merely the addition of a supplement. More than one-third of the book, or nearly eight hundred pages, is entirely new matter, while the whole work has been rewritten. The 'National Formulary' has been incorporated.

LETTERS TO THE EDITOR.

The Corean Potter's Wheel.

THE Corean potter's wheel consists of a circular table from two to three feet in diameter and four to six inches thick, made of heavy wood so as to aid in giving impetus to it when revolving. In general appearance it is not very unlike a modeller's table. This arrangement is sunken into a depression in the ground, and revolves easily by means of small wheels working on a track underneath, the table being pivoted in the centre. The wheel is operated directly by the foot, without the aid of a treadle of any kind. The potter sits squatting in front of the wheel, his bench or seat on a level with it, and space being left between his seat and the wheel to facilitate his movements. With his left foot underneath him, he extends his right foot, and strikes the side of the wheel with the bare sole of the foot, causing it to revolve. P. L. JOUY.

Washington, Sept. 12.

Poison-Apparatus of the Mosquito.

MY former notes on this subject (*Science*, Aug. 26, 1887; *Proceedings of the American Association*, 1887) require amendment in the following respects: (1) the poison-fang is single, being in fact the hypopharynx, as was suspected by Dimmock; (2) the paired branches of the poison-duct run backwards into the prothorax; (3) the secreting-glands are in two paired systems, one system on each side in the prothorax. Each system consists of three trifoliate glands, the mid-gland being poisonous, and the lateral ones salivary; the three ductules uniting into the branch of the poison-duct of its own side. The other details are as before described. G. MACLOSKIE.

Princeton College, Sept. 15.

Answers.

36. DOUBLE FRUIT. — A note in *Science* of Sept. 7 prompts me to say that in 1851 I resided on a lot in this city on which was a large number of fruit-trees, including peaches and plums of several varieties each, with cherry and apple trees. The crop of fruit was very large, and specimens of double fruit were very common on all the trees, including peaches, plums, cherries, and apples. Many of them were but slightly attached at the stem; others, two perfect specimens, attached through their whole length. In the garden double cucumbers were common. Doublets of the same kind were common in the market that season. I cannot answer as to the blossoms, having noticed nothing peculiar about them except their abundance. JOHN J. JANNEY.

Columbus, O., Sept. 16.